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Edmonton

SERVICE MANUAL No. I-0019

SELF CONTAINED

HYDRAULIC ACTUATOR

CUSTOMER:___________________________________

P.O.#:______________________________________

W.O.#:______________________________________

TAG:____

DATE:_______________________________________

APPLIES TO OPERATOR MODEL:__________________________________

SELF CONTAINED HYDRAULIC MODULE

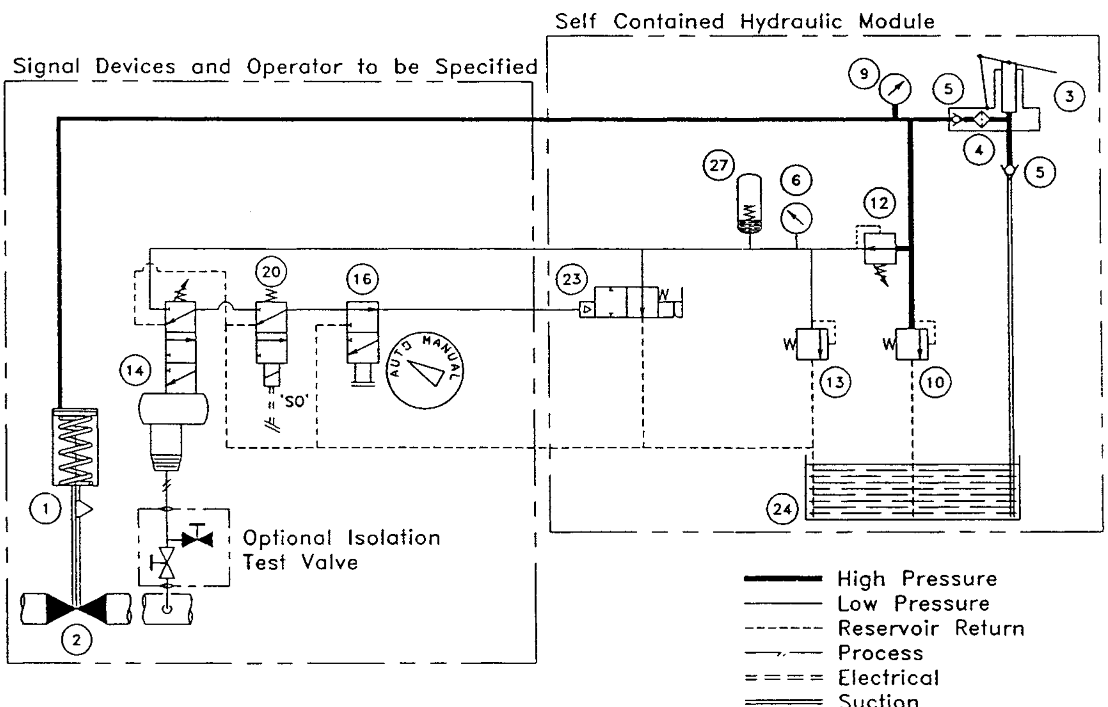
The compact Bettis Self Contained Hydraulic Module is designed to offer reliable emergency shutdown capability, using clean hydraulic fluid, when an external power source is either not available or not reliable.

The module is used in conjunction with Bettis linear or rotary spring return hydraulic operators to provide a fail safe system adaptable to ball, plug and other quarter turn valves as well as reverse acting gate and other linear operated valves.

The module has built–in temperature compensation and pressure relief and is proven reliable under the most demanding operating and environmental conditions.

The module is the foundation for a flexible system, and the example below, while not typical, does illustrate the operating method and a variety of available sensing and control options.

Operation:
- Shown with line valve closed, reset valve unlatched
- Latch reset valve (23), then operate handpump (3) to open line valve (2)
- System enters automatic mode when pilot (14) senses pressure within setpoints and solenoid (20) is energized
- Line valve closes if:
  - i) Reset valve (23) is switched manually, or
  - ii) Pilot (14) senses pressure out of range, or
  - iii) Selector valve (16) is switched to "MANUAL", or
  - iv) Solenoid (20) is de–energized



LIST OF COMPONENTS:

1	OPERATOR	9	GAUGE, HP	20	SOLENOID VALVE, N.C. (OPTIONAL)
2	LINE VALVE	10	RELIEF VALVE, HP	23	RESET VALVE
3	HANDPUMP	12	PRESSURE REGULATOR	24	RESERVOIR
4	FILTER	13	RELIEF VALVE, LP	27	ACCUMULATOR
5	CHECK VALVE	14	PRESSURE PILOT (OPTIONAL)		
6	GAUGE, LP	16	SELECTOR VALVE (OPTIONAL)		

C-0251--DWG JUN-05-95
SCALE: NTS REV 1-

I INSTALLATION

Refer to schematic drawing C-0251.

The self contained hydraulic esd module is usually factory installed on the operator, but can be field installed by the user.

The module type may be :
a) low pressure MAWP 200 psi.
b) high pressure MAWP 1500 psi.

It is mounted on the operator with bracket(s) and mounting bolts.

Identified on manifold assembly :
(H) High pressure hydraulic supply to the operator
(L) Low pressure hydraulic supply for monitoring/devices
(S) Low pressure hydraulic signal for RESET VALVE from monitoring/ESD devices
(V) Vent or return line to allow off panel devices to return oil to the reservoir

Connections are as shown on the schematic, and also tagged at the factory. Solenoid valve(s), if applicable, have been factory installed and tubed, ready for electrical connections. The breather/fill port of the reservoir may be plugged with a metal or plastic plug, if so remove and replace with breather provided in bag attached to the unit.

An aviation grade hydraulic fluid (ESSO UNIVIS or EQUIVALENT) is used in all BETTIS operator systems, or per customer request.

OPERATION

a) MANUAL MODE (TO START-UP/ RESET)

1. Lift the toggle on the manual pilot valve and latch in the up position. Refer to drawing C-0069 for "Manual Reset" position.

2. Operate handpump to open/close line and pressurize system.

3. Stop pumping when high pressure gauge reading is approximately 10% above the minimum value required to hold line valve in position.

4. At this point, hydraulic pressure opposing the operator spring holds the line valve in position.

   NOTE: To start-up without complete system connections PLUG (L) LOW PRESSURE to prevent fluid flow off the panel. Follow instructions above to operate unit.

b) AUTOMATIC MODE (TO RUN)

1. Lower the toggle on the manual pilot valve. Refer to drawing C-0069 for “Auto/Run" position.

2. Automatic mode is attained when signal device(s) is satisfied. Solenoid valve(s) is returned to normal operating condition (ie. energized, de-energized).

SHUTDOWN

a) **Signal devices:** If the pilot senses pressure outside of the setpoints; or if there is an applied/removed electrical signal to solenoid; it removes the signal to the manual pilot valve. This manual pilot valve switches, which allows the spring in the operator to stroke the line valve to the failsafe position.

b) **Manual shutdown:** Push toggle to shutdown manually.

MAINTENANCE

NOTE: Regular maintenance should be performed each autumn or as required.

1. Drain any accumulated moisture from fluid reservoir.
2. Check, clean and/or replace filter element(s).
3. Check pressure relief valve(s) setpoints and reset values.
4. If possible check operation and calibration of pressure pilot/solenoid.
5. Top up hydraulic fluid with compatible fluid.

TROUBLE SHOOTING

NOTE: As shown in the schematic, high pressure side of the system supplies the low pressure regulated side, therefore any leakage on the low side will cause significant changes in high pressure gauge values in a short time period.

Without cycling the unit, but with the pressurized removal of the reservoir and off panel device, vent/return lines will assist in tracing leakage. To accomplish this:

1. Remove vent line from pilot/solenoid vent port. This isolates it from the SCH module and allows for observation of any oil leakage through the device

   NOTE: This checks poppet/spool and spool/sleeve o-ring seal in operating positions.

2. Remove reservoir from module to observe components (reliefs and reset valve) for oil leakage while under normal operating pressures.

3. Remove filter plug, spring, and filter in handpump subplate to observe backside of HP discharge. Check for leakage across and around it with high pressure being applied.

4. Remove fitting and tubing or plug from module second vent port to observe any oil leakage due to manifold porosity between LP channel and VENT channel.

5. Remove operator inspection cover/plate and or tubing from cylinder plate port to observe any oil leakage across piston seal and piston centre o-ring.

In the case of pumping problems, access to pump suction valve is gained by removing pump assembly from subplate. Pumping difficulties usually result from dirty filter element, contaminated oil (water, methanol), or incorrect fluid type.

Failure of the regulator to regulate is noticeable in that after two pump strokes low pressure gauge reading is 130 PSI. Service regulator according to enclosed bulletin.

NOTE: Depressurize system before removing/disassembling any components on the manifold.

II SPECIFICATIONS

1. High pressure SCH module with HP-2-SC OR BHP 3 handpump, 0-2000 PSI HP gauge, and 0-160 PSI LP gauge:

    a) HP Relief set at 1500 - 1750 PSI

    b) LP Relief set at 130 PSI

    c) MECO Regulator set at 80 -100 PSI, recommended setting 80 PSI.

2. Low pressure SCH module with HP-2-SC handpump, and 0-300 PSI LP gauge:

    a) LP Relief set at 250 PSI

3. Common components to the low and high pressure systems include:

a) Pilot to close valve, reset valve, toggle valve, or manual pilot valve requires 40 to 60 PSI on the signal port to sustain auto mode.

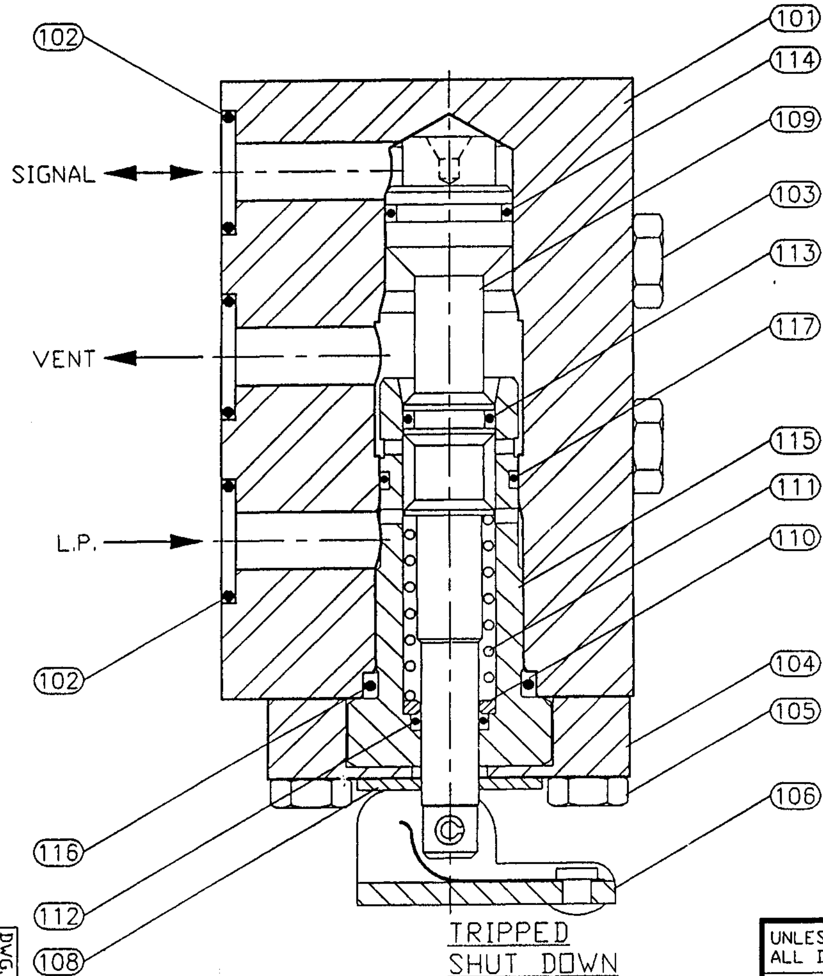
b) Solenoid valve with voltage of 24 VDC, 125 VDC, or 120 VAC with MAWP 150 PSI to be specified by user.

c) High/Low pressure pilot upper block connected to the self contained hydraulic module, with an operating pressure from 60 to 130 PSI. Process sensing pressure MAWP depends on the manufacturer.

d) For valve operator, see the service manual for particular type.

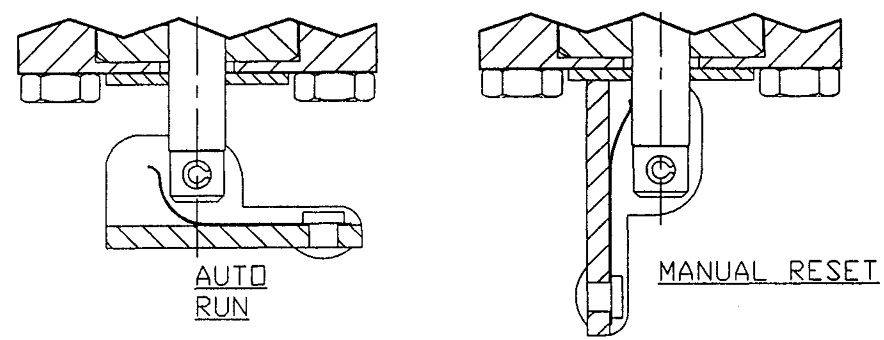
e) Reservoir is cast aluminum, fabricated steel is optional.

NOTE: If parts are required, advise model and serial number of equipment.



ITEM	DESCRIPTION	MATERIAL	QTY	NOTE
101	BODY, RESET VALVE	AL 6061-T6	1	
102	O-RING, RESET VALVE	NITRILE	3	(Y)
103	CAPSCREW, RESET VALVE	SS 304	3	
104	SLEEVE RETAINER	AL 6061-T6	1	
105	CAPSCREW, SLEEVE RET	SS	2	
106	TOGGLE ASSEMBLY	AL 6061-T6/SS 301	1	
107	SLOTTED SPRING PIN	SS 420	1	
108	WASHER TOGGLE	NYLON	1	(Y)
109	SPOOL, RESET VALVE	AL 6061-T6	1	
110	WASHER, SPRING	AL 6061-T6	1	
111	SPRING, RESET VALVE	SS 302	1	
112	O-RING, SLEEVE STEM	NITRILE	1	(Y)
113	O-RING, SPOOL	NITRILE	1	(Y)
114	O-RING, SPOOL PISTON	NITRILE	1	(Y)
115	SLEEVE, RESET VALVE	TEFLON	1	
116	O-RING, SLEEVE HEAD	NITRILE	1	(Y)
117	O-RING, SLEEVE	NITRILE	1	(Y)

NOTE: (Y) RECOMMENDED SPARE PARTS/REPAIR KIT
FASTENERS AND SERVICE TOOLS ARE ANSI/INCH SIZE



UNLESS SPECIFIED OTHERWISE
ALL DIMENSIONS INCHES [mm]

REDRAW, UPDT STDS, WAS I-0019-04
4 RS-1996-10-15 @ SALES
UPDATE TITLE BLOCK
3 MN-1992-10-13 @ SALES
REV BY-DATE+REF

BETTIS Actuators & Controls

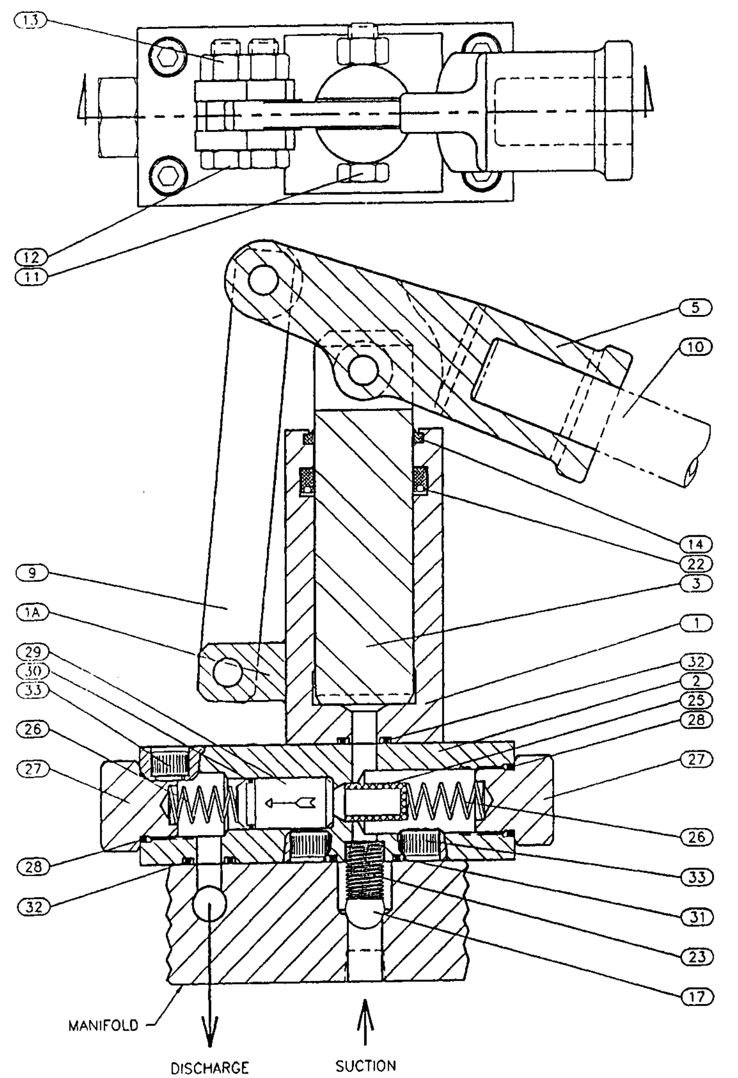
BETTIS CANADA LTD.

RESET VALVE
FOR SELF-CONTAINED HYDRAULIC

C-0069--.DWG_VIEW_00
OCT-15-96

SCALE 1:1	BY KW	CHK AAM 10-31	DATE JUN-12-84		
W.O. ---	DWG. NO. C-0069	REV 4-			

DWG. NO. C-0069



ITEM	PART NO.	DESCRIPTION	MATERIAL	QTY	NOTE
1	908-001	BODY	AISI C1020 ZN PL	1	
1A	908-001	PIVOT	AISI C1020 ZN PL	1	
2	908-002	BASE	AL 6061-T6	1	
3	908-003	RAM	AISI C1045 CH PL	1	
5	908-005	LEVER	D.I. 65-45-12 PL	1	
9	908-009	CONNECTING LINK	AISI C1020 ZN PL	2	
10	908-010	HANDLE	ASTM A53-B ZN PL	1	
11	908-011	PIN, RAM	HXHC GR 5 ZN PL	1	
12	908-012	PIN, CONNECTING LINK	HXHC GR 5 ZN PL	2	
13	908-013	LOCKNUT	HEXN ZN PL	3	
14	908-014	WIPER	URETHANE	1	(Y)
17	908-017	BALL, SUCTION PORT	CH PL STEEL	1	
22	908-022	ROD POLYPAK	URETHANE/NITRILE	1	(Y)
23	908-023	SPRING, SUCTION PORT	SS 302	1	
25	908-025	FILTER ELEMENT	SS 316	1	
26	908-026	SPRING	SS 302	2	
27	908-027	END PLUG	AL 7075-T651	2	
28	908-028	O-RING, END PLUG	NITRILE	2	(Y)
29	908-029	CHECK VALVE CARTRIDGE	CS/NITRILE	1	
30	908-030	O-RING, CHECK VALVE	NITRILE	1	(Y)
31	908-031	O-RING, SUCTION PORT	NITRILE	1	(Y)
32	908-032	O-RING, BODY	NITRILE	2	(Y)
33	908-033	SOCKET HEAD SCREW	HXSC GR 8 ZN PL	4	

NOTE:
- BODY AND HANDLE MAY BE ROTATED TO ANY QUADRANT (SHOWN STANDARD)
- ITEM 1 AND 1A ARE WELDED
- (Y) SOFT PARTS REPAIR KIT PART NO. SPRK-HP2_SC
- FASTENERS AND MAINTENANCE TOOLS ARE ANSI/INCH SIZE

SPECIFICATIONS:
TEMP. RATING: -50°F TO 170°F [-46°C TO 77°C]
MASS: 8.11 LBm [3.68 kg]
M.A.W.P.: 2000 PSIG [13,789 kPag]
DISPLACEMENT: 2 CU. IN [32 mL] PER CYCLE

UNLESS SPECIFIED OTHERWISE
ALL DIMENSIONS INCHES [mm]

UPDT STDS, UPDT TABLE, ADD SPEC, SPRK, AND TOOL SIZE
VL-1995-11-3089715-1-S
REDRAWN, UPDT STDS
KN-1992-10-13ESALES
REV BY-DATE-REF

TOLERANCES
XXX ±0.5 [±10]
XX ±0.2 [±5]
X ±0.1 [±2]

BETTIS Actuators & Controls — BETTIS CANADA LTD.

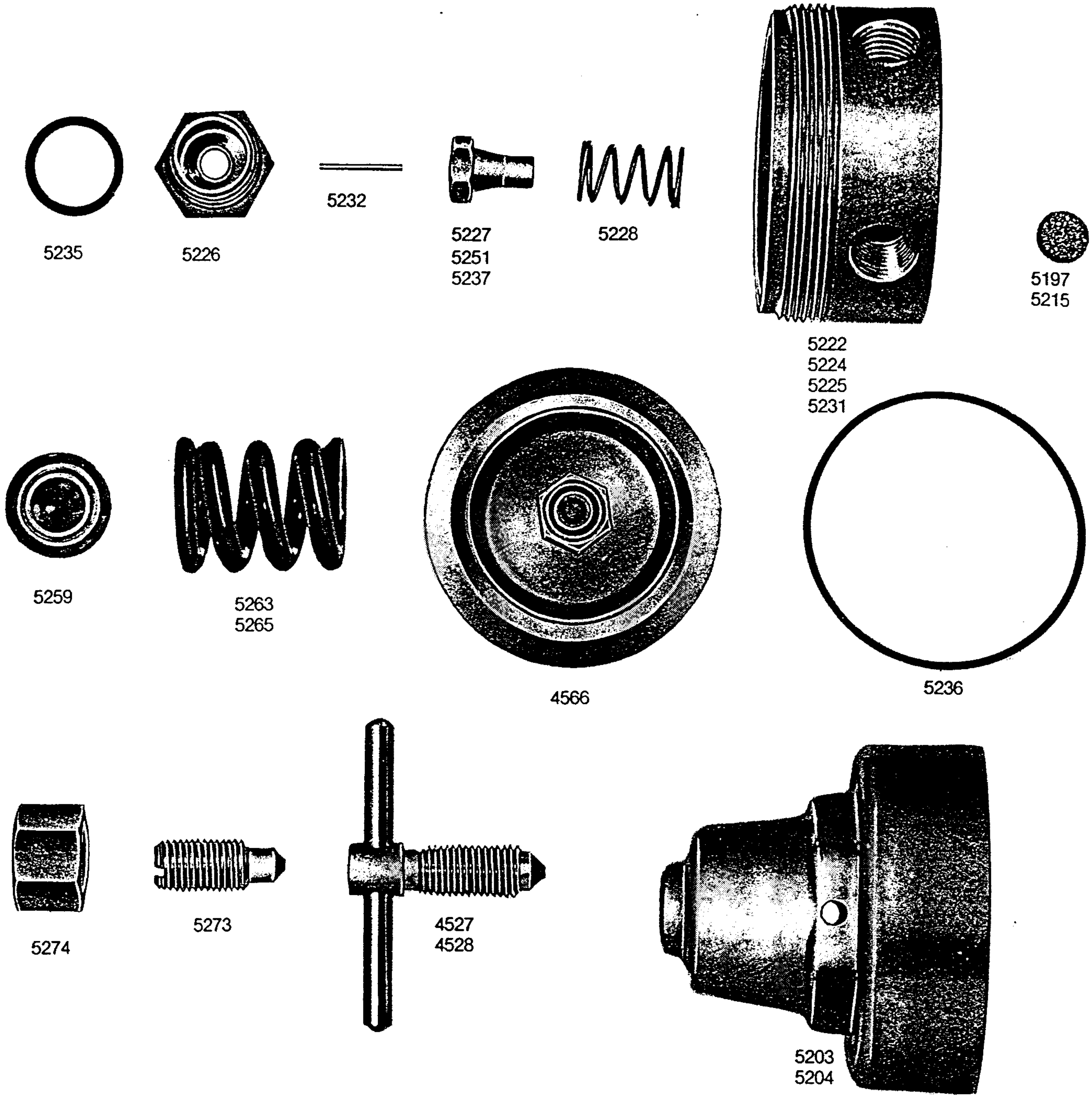
HANDPUMP MODEL HP-2-SC
ASSEMBLY AND SPECIFICATIONS
FOR PRESSUREGUARD (SELF CONTAINED HYDRAULIC)

A-0188--.DWG_VIEW_00
DEC-01-95

SCALE 2:3 | BY KW | CHK | DATE AUG-08-83
W.O. 8388-1-R | DWG. NO. AB0188 | REV 3-

DWG. NO. AB0188

TYPE B INDUSTRIAL REGULATOR
PARTS LIST



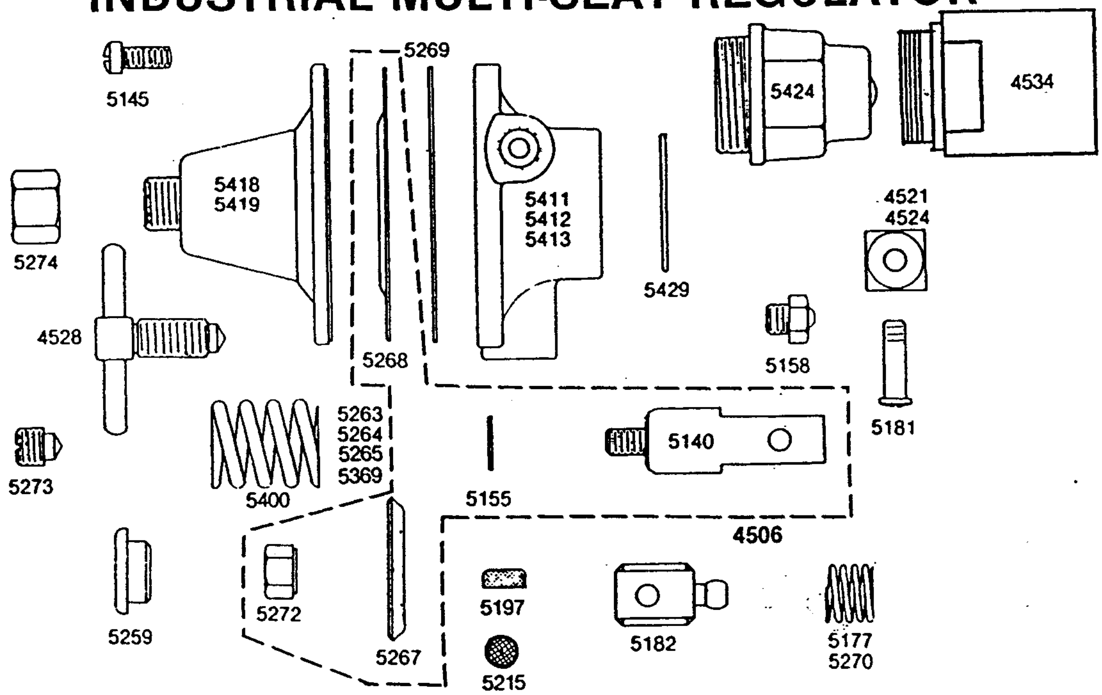
Stock No. — **Description**

4527—J-4B Low Pressure Tee Adj. Screw
4528—J-4 High Pressure Tee Adj. Screw
4566—B-7 Diaphragm Assembly
5197—Filter Screen, Brass
5203—B-12-A Cap Type Bonnet
5204—B-12 Tee Type Bonnet
5215—Sintered Brass Filter
5222—B-1F Body (for flowmeter outlet)
5224—B-1A Industrial Body, 1-HP, 2-LP
5225—B-1C Industrial Body, 1-HP, 3-LP
5226—A-B-2 Nozzle
5227—A-B-3 Seat Assembly, Buna-N

Stock No. — **Description**

5228—A-B-4 Seat Spring
5231—B-1-B Industrial Body, 2-HP, 2-LP
5232—.687 Push Off Pin (for all gases)
5235—Nozzle Seal "O" Ring, Pkg. 12
5236—Diaphragm Seal "O" Ring, Pkg. 12
5237—Seat Assembly, Viton
5251—Seat Assembly, Neoprene
5259—J-5 Spring Button
5263—J-7A Bonnet Spring, 20 PSI
5265—J-7-150 Bonnet Spring, 150 PSI
5273—J-30 Slotted Adjusting Screw
5274—J-31 Hex Protection Cap

TYPE P-30, P-50, P-125, P-150, & P-225
INDUSTRIAL MULTI-SEAT REGULATOR



Stock No.	Description
4506	Diaphram-Yoke Assembly
4521	Seat Block with White Nylon Seats
4524	Seat Block with Kel-F Seats for CO_2
4528	Adjusting Screw Assembly
4534	ENVIRO-CAP, Water Heated Back Cap Assembly
5140	Yoke (Part of 4506)
5145	Bonnet Screw 6 required, Pkg. 12
5155	Yoke Gasket, Teflon, Pkg. 12 (Part of 4506)
5158	Nozzle with 5/64" Orifice, Pkg. 6
5177	Rear Spring, for over 500 PSI Inlet Pressure, Standard
5181	Yoke Clamping Screw, Pkg. 6
5182	Yoke Guide
5197	Filter Screen, pkg. 6
5215	Sintered Filter, pkg. 12, Standard
5259	Spring Button
5263	Compression Spring for 30 PSI Pressure (Red)
5264	Compression Spring for 125 PSI Pressure (Green)
5265	Compression Spring for 150 PSI pressure (Purple)
5267	Diaphragm Plate (Part of 4506)
5268	Stainless Steel Diaphragm (Part of 4506)
5269	Diaphragm Gasket, Pkg. 6
5272	Diaphragm Plate Nut (Part of 4506)
5273	Slot Type Adjusting Screw
5274	Protection Cap for Slot Adjusting Screw
5369	Compression Spring for 50 PSI pressure (Black)
5400	Compression Spring for 225 PSI pressure (Grey)
5411	Body, 1 inlet, 2 outlets P-1-DA
5412	Body, 1 inlet, 3 outlets P-1-DC
5413	Body, 2 inlets, 2 outlets P-1-DD
5418	Bonnet, for "T" Type Adjusting Screw
5419	Bonnet, for Slotted Type Adjusting Screw
5423	Allen Head Adj. Screw
5424	Back Cap
5429	Back Cap Gasket, Teflon, Pkg. 12

III PRESSUREMATIC

Set point adjustment for Series 2000, 2200, 2400:

NOTE: Refer to drawing APB0570.

This is done with the assembly complete and supply air on the pilot valve for P-AR and P-MR models.

NOTE: In the field this requires a calibration kit with the ability to supply high and low setpoint pressures (eg. nitrogen bottle with block & bleed valve).

1. Cases with low and high set points:

   NOTE: The low set point must be adjusted first. It will not be affected by the high set point adjustment but the high set point is affected when the low set point is adjusted.

   a) Set the high trip bolt fully away from the trip spring.

   b) Repeatedly adjust the low trip bolt and decrease pressure through the low set point until the low trip occurs consistently at the low set point. Tighten the lock nut and recheck. Check that there is at least 0.02" piston travel from low trip to bottom stop.

      NOTE: When adjusting the low trip bolt, the upper arm of the trip spring must be pushed down. This unloads the bolt and allows it to be turned by hand.

   c) Repeatedly adjust the high trip bolt and increase pressure through the high set point until the high trip occurs consistently at the high set point. Tighten the lock nut and recheck.

2. Cases with low set point only:

   a) Set high trip bolt fully away from the trip spring.

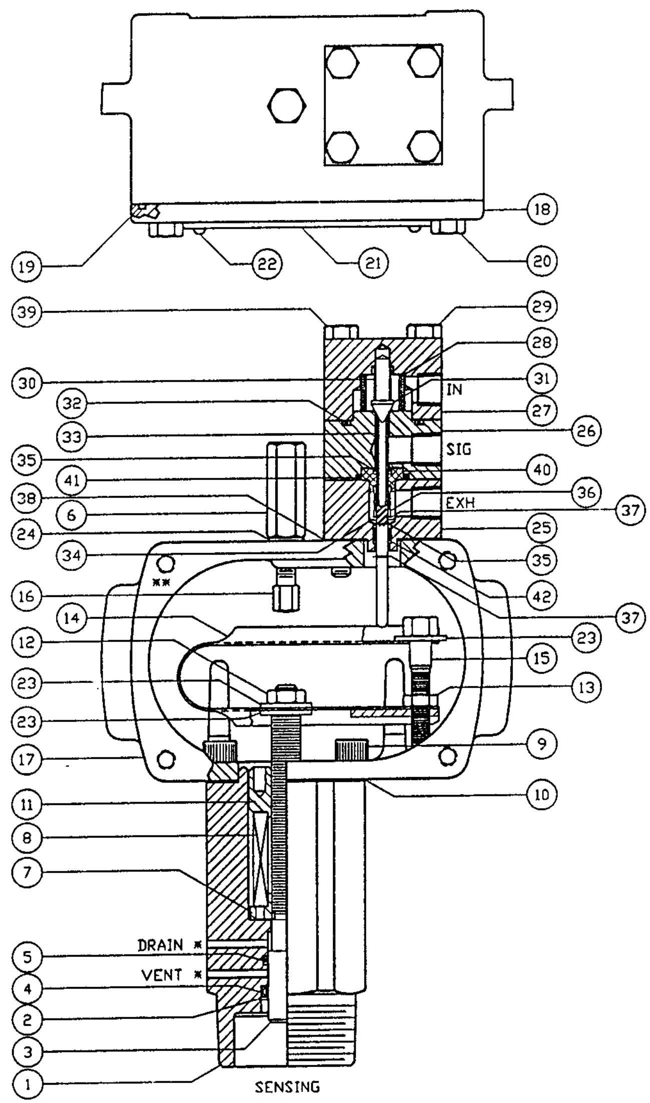
   b) Adjust the low set point as described in 1.b) above.

   c) To disable high trip, increase pressure until piston is at upper stop. Adjust high trip bolt downward until high trip occurs then retract 1/2 turn. Check that high trip does not occur when piston travels to upper stop. This high trip bolt adjustment is to prevent the trip spring from placing unnecessary force on the spool.

3. Cases with high set point only:

   a) To disable low trip, adjust low trip bolt until low trip occurs when piston is within 0.020” of bottom stop. Then adjust 3 turns upward (ccw viewed from above). Tighten locknut and check that low trip does not occur when piston travels to bottom stop.

   b) Adjust the high set point as described in 1.c) above.



ITEM	DESCRIPTION	MATERIAL	QTY	NOTE
1	BODY	C1018	1	
2	RETAINING RING, BODY	SS 304	1	
3	PISTON	SS 316	1	
4	SEAL #1, PISTON	TFE	1	(Y)
5	SEAL #2, PISTON	NITRILE	1	(Y)
6	HIGH TRIP BLIND NUT	AL 2011-T3	1	
7	SPRING SEAT	CS PL	1	
8	RANGE SPRING	CR-V ALLOY	1	(V)
9	BOLT, BODY	SS 304	2	
10	GASKET, BODY	PLANT FIBRE	1	(Y)
11	RANGE SCREW	SS 416	1	
12	JAM NUT, TRIP SPRING	SS 304	1	
13	JAM NUT, LOW TRIP BOLT	SS 304	1	
14	TRIP SPRING ASSEMBLY	SS 301	1	
15	LOW TRIP ADJUSTMENT BOLT	AL 6061-T6	1	
16	HIGH TRIP BOLT	SS 316	1	
17	HOUSING	AL CAST	1	
18	COVER PLATE	AL CAST	1	
19	O-RING, COVER	NITRILE	1	(Y)
20	BOLT, COVER	SS 304	4	
21	NAMEPLATE	SS 304	1	
22	DRIVE SCREW, NAMEPLATE	SS 18-8	4	
23	WASHER, TRIP SPRING	SS 304	3	
24	STAT-O-SEAL	CS/NITRILE	1	(Y)
25	LOWER BODY, PILOT	AL 6061-T6	1	
26	UPPER BODY, PILOT	AL 6061-T6	1	
27	END CAP, PILOT	AL 6061-T6	1	
28	FILTER ELEMENT, PILOT	CELLULOSE/RESIN	1	(Y)
29	CAPSCREW, END CAP	SS 304	2	
30	SPRING, POPPET	SS 302	1	
31	POPPET, PILOT	TFE	1	(Y)
32	O-RING, UPPER BODY	NITRILE	1	(Y)
33	SPOOL, PILOT	SS 304	1	
34	RETAINING RING, SEAL	SS 304	1	(Y)
35	O-RING, SPOOL	NITRILE	2	(Y)
36	SPRING, SPOOL	SS 302	1	
37	RETAINING RING, SPOOL	SS 304	2	
38	GASKET, PILOT	PLANT FIBRE	1	(Y)
39	CAPSCREW, PILOT MOUNTING	SS 304	2	
40	SLEEVE, PILOT	DELRIN	1	(Y)
41	O-RING, SLEEVE	NITRILE	1	(Y)
42	BUSHING, SPOOL	TFE	1	

NOTE: (Y) RECOMMENDED SPARE PARTS/REPAIR KIT, (V) TO BE SPECIFIED
FASTENERS AND MAINTENANCE TOOLS ARE ANSI/INCH SIZE
* VENT AND DRAIN SHOWN -30° FROM TRUE POSITION
** SHOWN WITH COVER REMOVED

UNLESS SPECIFIED OTHERWISE
ALL DIMENSIONS INCHES (mm)

UPDT HOUSING '17', BOLTS WERE CS
RS-1996-08-14 @ SALES REQ
UPDT STDS
RS-1995-12-13 @ SALES REQ
UPDT SPOOL, TFE POPPET
DY-1993-03-24 @ 9248
+TRIP SPRING NUT, WASHER
DY-1991-12-02 @ 8980
REV BY-DATE+REF

TOLERANCES
XXX ±0.5 (±10)
XX ±0.2 (±5)
X ±0.1 (±2)

BETTIS Actuators & Controls — BETTIS CANADA LTD.

PRESSUREMATIC ASSEMBLY
(P-AR2000 TYPICAL, CS BODY, STD TRIM)

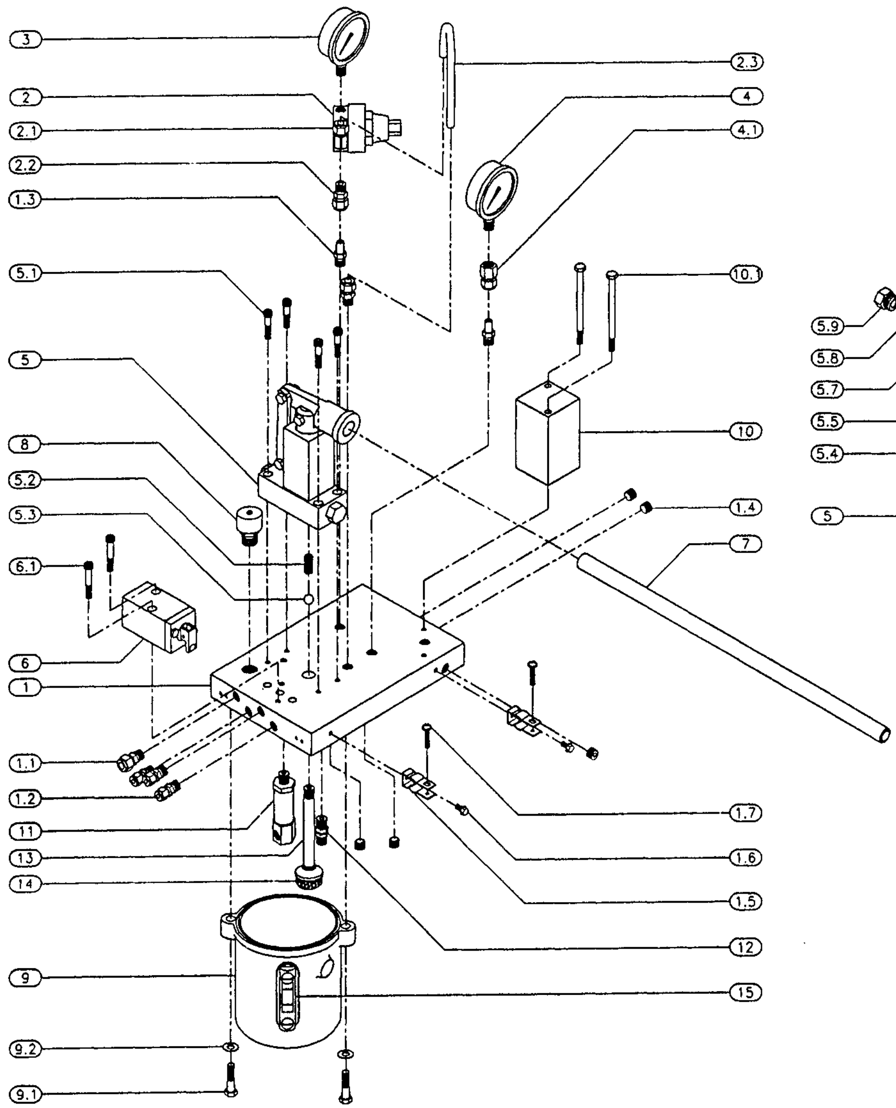
AP0570--.DWG_VIEW_00
DEC-18-96

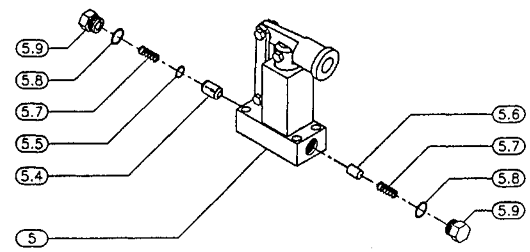
WEIGHT 11.0 LB

SCALE 1:2 | BY DY | CHK | DATE OCT-21-91

V.O. 8980-R&D | DWG. NO. APB0570 | REV 4-

DWG. NO. APB0570





HANDPUMP DETAIL △

ITEM	DESCRIPTION
1	MANIFOLD
1.1	TUBE FITTING, 3/8 DIA (FEMALE)
1.2	TUBE FITTING, 1/4 DIA (FEMALE)
1.3	TUBE FITTING, 3/8 DIA (MALE) △
1.4	PLUG, 1/4 NPT
1.5	HANDLE CLIP
1.6	BOLT, HANDLE CLIP
1.7	SCREW, HANDLE CLIP

ITEM	DESCRIPTION
2	REGULATOR
2.1	ELBOW FITTING, 3/8 DIA (FEMALE)
2.2	TUBE FITTING, 3/8 DIA (FEMALE) △
2.3	TUBING, 3/8 DIA
3	HIGH PRESSURE GAUGE
4	LOW PRESSURE GAUGE
4.1	TUBE FITTING, 3/8 DIA (FEMALE) △
5	HANDPUMP
5.1	BOLT, HANDPUMP
5.2	SPRING, HANDPUMP, SUCTION CHECK VALVE
5.3	BALL, HANDPUMP, SUCTION CHECK VALVE
5.4	DISCHARGE CHECK, HANDPUMP
5.5	O-RING, HANDPUMP, DISCHARGE CHECK
5.6	FILTER, HANDPUMP
5.7	SPRING, HANDPUMP
5.8	O-RING, HANDPUMP, END PLUG
5.9	END PLUG, HANDPUMP
6	MANUAL PILOT VALVE
6.1	BOLT, PILOT VALVE
7	HANDPUMP HANDLE
8	FILLER/BREATHER △
9	RESERVOIR
9.1	BOLT, RESERVOIR
9.2	WASHER, RESERVOIR
10	ACCUMULATOR
10.1	BOLT, ACCUMULATOR
11	HIGH PRESSURE RELIEF VALVE
12	LOW PRESSURE RELIEF VALVE
13	RISER
14	SUCTION STRAINER
15	LEVEL GAUGE

SPECIFICATIONS:
PORTS: 1/4 NPT
TEMP. RATING: -50°F TO 170°F [-46°C TO 75°C]
MASS: 39.0 LBm [18.0 kg]
MAX. WORKING PRESSURE: 200, 1500 OR 2000 PSIG [1379, 10,342, OR 13,789 kPag]
FASTENERS AND TOOLS: ANSI/INCH SIZE

UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS INCHES [mm]

RENAME PRESSUREGUARD, ADD HANDPUMP DETAIL, CORRECT FILLER/BREATHER TYPO, ADD FITTING MTG FOR REGULATOR AND GAUGE
△ VL-1995-12-0189715-1-S
REV BY-DATE+REF

TOLERANCES
XXX ±0.5 [±10]
XX ±0.2 [±5]
X ±0.1 [±2]

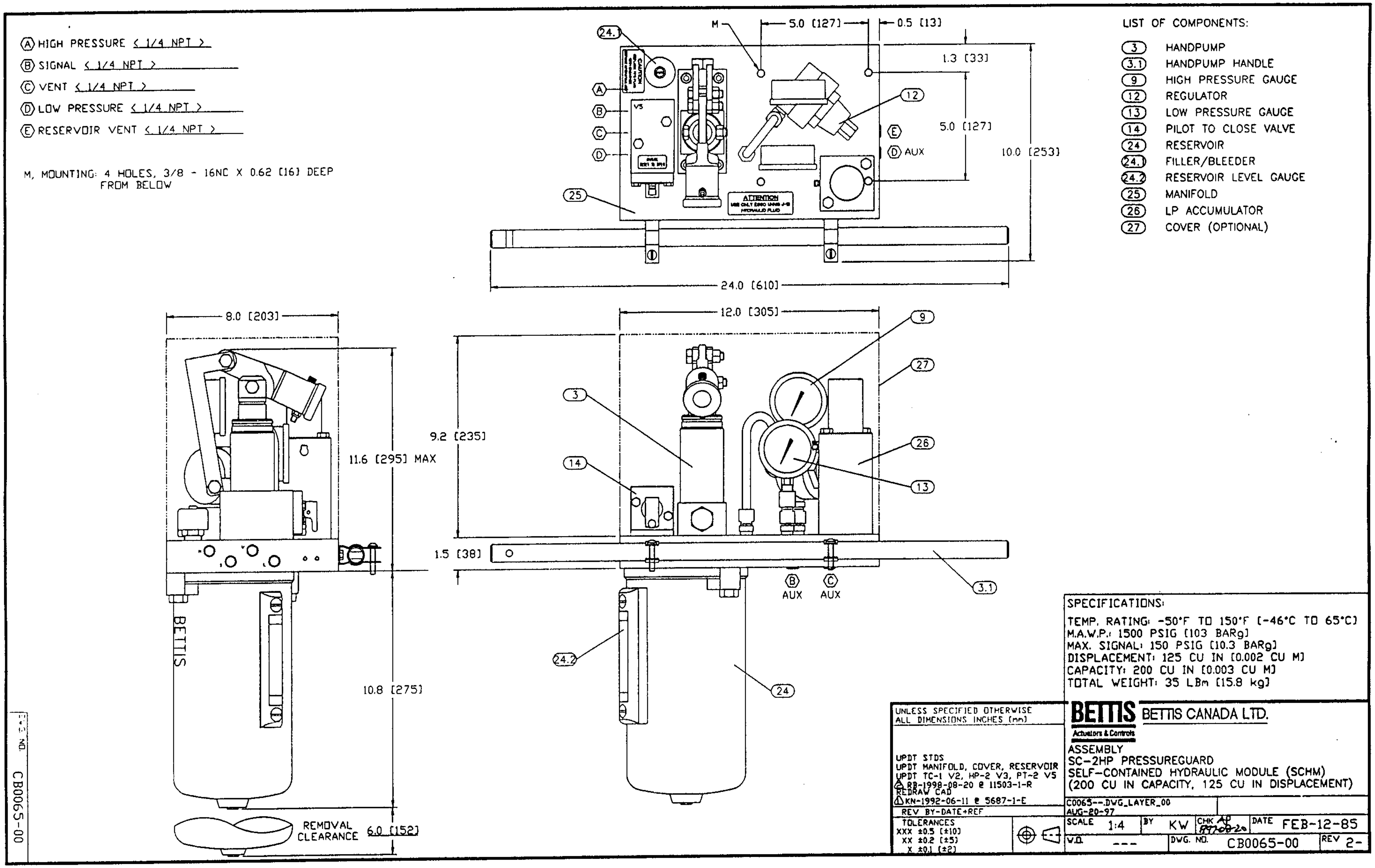
BETTIS Actuators & Controls — BETTIS CANADA LTD.

PRESSUREGUARD (SELF CONTAINED HYDRAULIC) EXPLODED ASSEMBLY AND SPECIFICATIONS

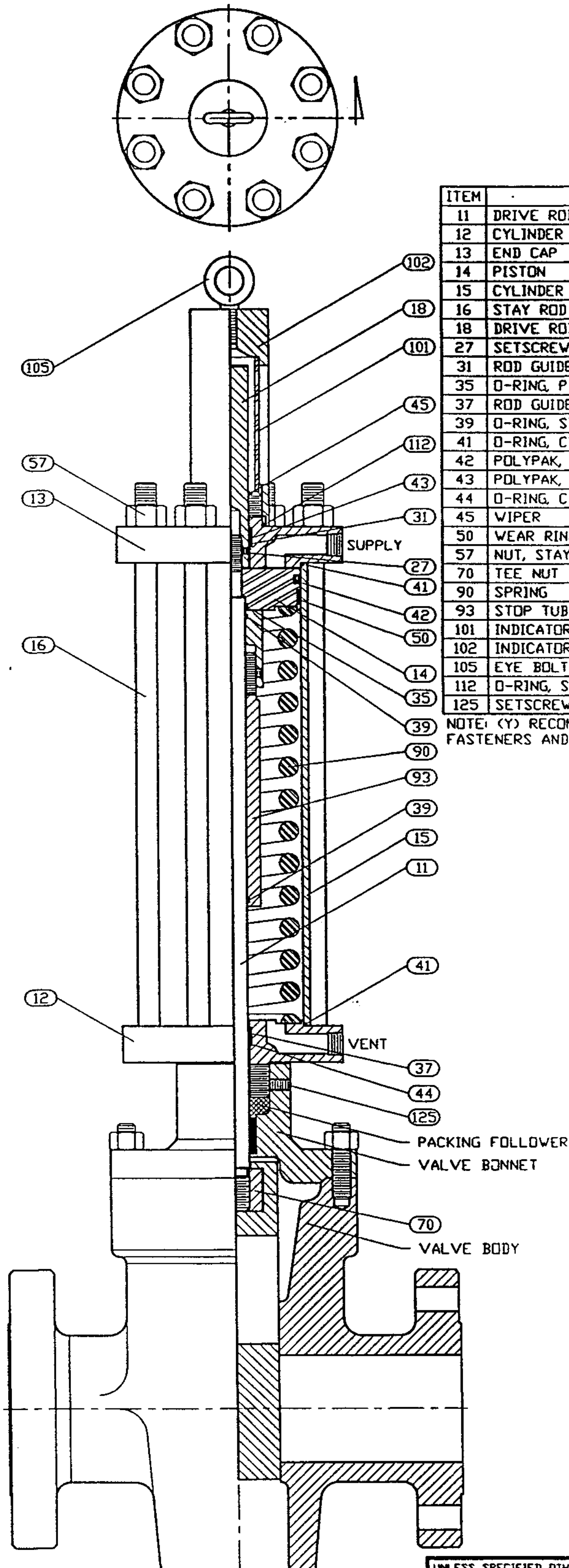
C-006510.DWG
DEC-01-95

SCALE 1:8	BY VL	CHK	DATE MAR-31-95
V.D. 7482-1-B	DWG. NO. CB0065-10		REV 1-

DWG. NO. CB0065-10


Ⓐ HIGH PRESSURE < 1/4 NPT >
Ⓑ SIGNAL < 1/4 NPT >
Ⓒ VENT < 1/4 NPT >
Ⓓ LOW PRESSURE < 1/4 NPT >
Ⓔ RESERVOIR VENT < 1/4 NPT >
M, MOUNTING: 4 HOLES, 3/8 - 16NC X 0.62 [16] DEEP FROM BELOW
LIST OF COMPONENTS:
3 HANDPUMP
3.1 HANDPUMP HANDLE
9 HIGH PRESSURE GAUGE
12 REGULATOR
13 LOW PRESSURE GAUGE
14 PILOT TO CLOSE VALVE
24 RESERVOIR
24.1 FILLER/BLEEDER
24.2 RESERVOIR LEVEL GAUGE
25 MANIFOLD
26 LP ACCUMULATOR
27 COVER (OPTIONAL)
5.0 [127]
0.5 [13]
1.3 [33]
5.0 [127]
10.0 [253]
24.0 [610]
8.0 [203]
12.0 [305]
9.2 [235]
11.6 [295] MAX
1.5 [38]
10.8 [275]
REMOVAL CLEARANCE 6.0 [152]
Ⓔ
Ⓓ AUX
Ⓑ AUX
Ⓒ AUX
ATTENTION
BETTIS
SPECIFICATIONS:
TEMP. RATING: -50°F TO 150°F [-46°C TO 65°C]
M.A.W.P.: 1500 PSIG [103 BARg]
MAX. SIGNAL: 150 PSIG [10.3 BARg]
DISPLACEMENT: 125 CU IN [0.002 CU M]
CAPACITY: 200 CU IN [0.003 CU M]
TOTAL WEIGHT: 35 LBm [15.8 kg]
UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS INCHES [mm]
UPDT STDS
UPDT MANIFOLD, COVER, RESERVOIR
UPDT TC-1 V2, HP-2 V3, PT-2 V5
RB-1998-08-20 @ 11503-1-R
REDRAW CAD
KN-1992-06-11 @ 5687-1-E
REV BY-DATE+REF
TOLERANCES
XXX ±0.5 [±10]
XX ±0.2 [±5]
X ±0.1 [±2]
BETTIS Actuators & Controls
BETTIS CANADA LTD.
ASSEMBLY
SC-2HP PRESSUREGUARD
SELF-CONTAINED HYDRAULIC MODULE (SCHM)
(200 CU IN CAPACITY, 125 CU IN DISPLACEMENT)
C0065--.DWG_LAYER_00
AUG-20-97
SCALE 1:4
BY KW
DATE FEB-12-85
V.D. ---
DWG. NO. CB0065-00
REV 2-
DWG NO. CB0065-00

DWG. NO. CB0210



ITEM	DESCRIPTION	MATERIAL	QTY	NOTE
11	DRIVE ROD	17-4 PH OR AS SPEC	1	
12	CYLINDER PLATE	ASTM A516-70	1	
13	END CAP	ASTM A516-70	1	
14	PISTON	ASTM A516-70	1	
15	CYLINDER	AISI C1026	1	
16	STAY ROD	AISI 4140	8	
18	DRIVE ROD EXTENSION	AISI C1045 CH.PL	1	
27	SETSCREW	ANSI B18.3	1	
31	ROD GUIDE, UPPER	ACETAL	1	
35	O-RING, PISTON CENTER	NITRILE	1	(Y)
37	ROD GUIDE, LOWER	ACETAL	1	
39	O-RING, STOP	NITRILE	2	(Y)
41	O-RING, CYLINDER	NITRILE	1	(Y)
42	POLYPAK, PISTON	MOLYTHANE	1	(Y)
43	POLYPAK, END CAP	MOLYTHANE	1	(Y)
44	O-RING, CYLINDER PLATE	NITRILE	1	(Y)
45	WIPER	MOLYTHANE	1	
50	WEAR RING, PISTON	MOLYTHANE	1	
57	NUT, STAY ROD	ASTM A194 GR.2H	8	
70	TEE NUT	PER SPEC.	1	
90	SPRING	ALLOY STEEL	1	
93	STOP TUBE	AISI C1020	1	
101	INDICATOR SLEEVE	ACRYLIC	1	
102	INDICATOR COVER	AISI C12L14	1	
105	EYE BOLT	CS	1	
112	O-RING, SLEEVE	NITRILE	1	(Y)
125	SETSCREW	ANSI B18.3	1	

NOTE: (Y) RECOMMENDED SPARE PARTS/REPAIR KIT
FASTENERS AND MAINTENANCE TOOLS ARE ANSI/INCH SIZE

UNLESS SPECIFIED OTHERWISE
ALL DIMENSIONS INCHES [mm]

BETTIS Actuators & Controls — BETTIS CANADA LTD.

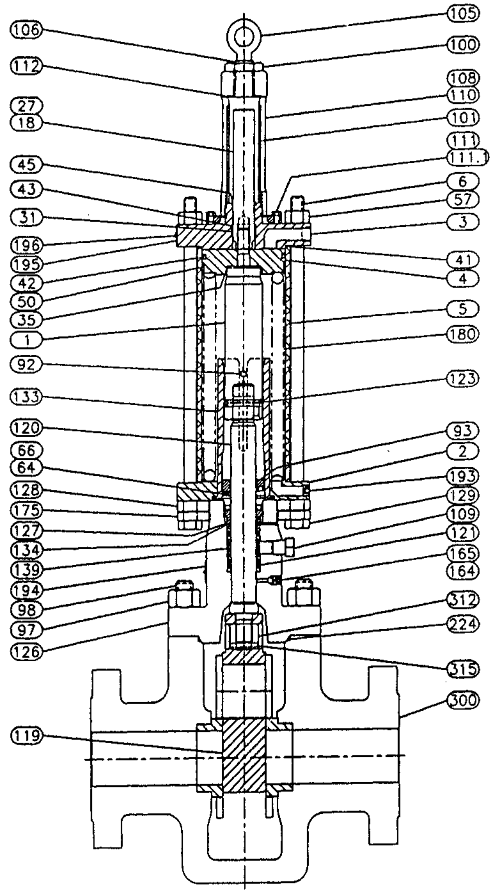
SERIES GVO-HP-FS
CLOSE COUPLED, THREADED BONNET
(TYPICAL REVERSE ACTING VALVE, SHOWN CLOSED)

*STD PART LIST TABLE, UPDT STDS
RS-1996-02-29 SALES REQ
MODEL 5x4x1 FOR 3838-1-E
REV BY-DATE+REF

C-0210--.DWG_VIEW_00
FEB-29-96

TOLERANCES
XXX ±0.5 [±10]
XX ±0.2 [±5]
X ±0.1 [±2]

SCALE 1:4	BY KN	CHK DH1996-03-01	DATE JUN-11-92
V.O. 5687-1-E	DWG. NO. CB0210		REV 1-



ITEM	DESCRIPTION	MATERIAL	QTY	NOTE	ITEM	DESCRIPTION	MATERIAL	QTY	NOTE
1	DRIVE ROD	AISI C1045 CH PL	1		110	INDICATOR COVER	AISI C12L14	1	
2	CYLINDER PLATE	A516-70/AISI C1018	1		111	POSITION PLATE	AISI C12L14	1	
3	END CAP	A516-70/AISI C1018	1		111.1	BOLT, POSITION PLATE	SAE GR 5	4	
4	PISTON	ASTM A516-70	1		112	O-RING, SLEEVE	NITRILE	1	(Y)
5	CYLINDER	AISI C1026 CH PL BORE	1		119	VALVE GATE	(Per Valve Mfr Spec)	1	(N)
6	STAY ROD	AISI 4140	8		120	VALVE STEM	UNS 17400 Type 630	1	
18	INDICATOR ROD	AISI C1045 CH PL	1		121	STEM PACKING SET	TFE/NITRILE	1	(Y)
27	SETSCREW, INDICATOR ROD	SS 304	1	(H)	123	COIL PIN, STEM	SS 302/../304	1	
31	ROD GUIDE, UPPER	DELRIN	1	(Y)	126	BONNET	ASTM A487 Gr 4C	1	
35	O-RING, PISTON CENTER	NITRILE	1	(Y)	127	PACKING FOLLOWER	AISI C1045	1	
41	O-RING, CYLINDER	NITRILE	2	(Y)	128	ADAPTER PLATE	AISI C1020	1	
42	POLYPAK, PISTON	URETHANE	1	(Y)	129	ADAPTER BOLT	SAE GR 5	4	
43	POLYPAK, END CAP	URETHANE	1	(Y)	133	ANTI-ROTATION TUBE	AISI C1018	1	
45	WIPER	URETHANE	1	(Y)	134	O-RING, PACKING FOLLOWER	NITRILE	1	
50	WEAR RING, PISTON	MOLYGARD	1	(Y)	139	LANTERN RING	SS 316	1	
57	NUT, STAY ROD	ASTM A194 2H	8		164	BLEEDER PLUG	SS 304/../316	1	
64	CAPSCREW, LOCK STOP	HXSC SS 316	1		165	BLEEDER BALL	SS 302	1	
66	WASHER, LOCK STOP	WSHE SS 410	1		175	BONNET LOCKPLATE	AISI C1020	1	
92	ANTI-ROTATION PIN	SS 302/../304	1		180	SPRING	AISI 5160 ALLOY STEEL	1	
93	LOWER STOP	AISI C1018	1		191	DECAL, PISTON TOP	VINYL	1	(H)
97	NUT, BONNET	(Per Valve Mfr Spec)	8	(N)	193	VENT/BREATHER	SS 304	1	
98	STUD, BONNET	(Per Valve Mfr Spec)	8	(N)	194	BONNET NAMEPLATE	SS 304	1	
100	INDICATOR COVER PLUG	AISI C12L14	1		195	ACTUATOR NAMEPLATE	SS 304	1	
101	INDICATOR SLEEVE	ACRYLIC	1		196	DRIVE SCREW	SS 301/../304	4	
105	EYEBOLT	ASTM A489 PL	1		224	BONNET GASKET	(Per Valve Mfr Spec)	1	(N)
106	WASHER, FLAT	SAE	1		300	VALVE BODY	(Per Valve Mfr Spec)	1	(N)
108	SETSCREW, INDICA'R COVER	SS 304	1	(H)	312	TEE NUT	(Per Valve Mfr Spec)	1	(N)
109	PLUG	ASTM A105	1		315	SPRING PIN, TEE NUT	SS 301/../304	1	

NOTE:
- (H) NOT SHOWN
- (N) SUPPLIED WITH VALVE, SHOWN FOR REFERENCE ONLY
- (Y) RECOMMENDED SPARE PARTS/REPAIR KIT
- REFER TO DWG AB0440 FOR ASSEMBLY INSTRUCTIONS
- SHOWN ROTATED 90° ON VALVE BODY, BLEEDER SIDE IS BODY IDENTIFICATION AND FITTING SIDE

STANDARD TRIM AS ABOVE UNLESS SPECIFIED BELOW

ITEM	DESCRIPTION	MATERIAL	QTY	NOTE

UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS INCHES (mm)

SUPERSEDES DWG. A-0444-10 R5 & DWG. A-0444 R4
PL-1997-07-21@12543-1-M
REV BY-DATE-REF

TOLERANCES
XXX ±0.5 [±10]
XX ±0.2 [±5]
X ±0.1 [±2]

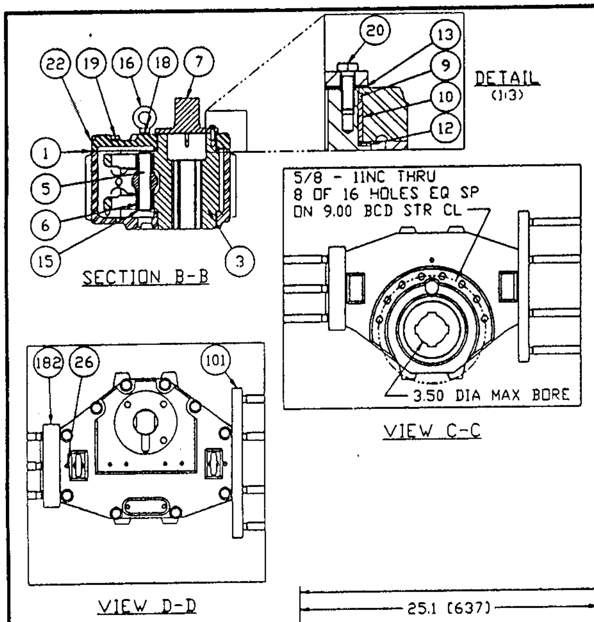
BETTIS Actuators & Controls BETTIS CANADA LTD.

ASSEMBLY DRAWING
GVO-HP-FS-UM
FOR REVERSE ACTING VALVE

AB0444--.DWG_VIEW_00
JUL-21-97

SCALE 1:7 | BY PL | CHK | DATE JUL-21-97
V.O. 12543-1-M | DWG. NO. AB0444-10 | REV 6-

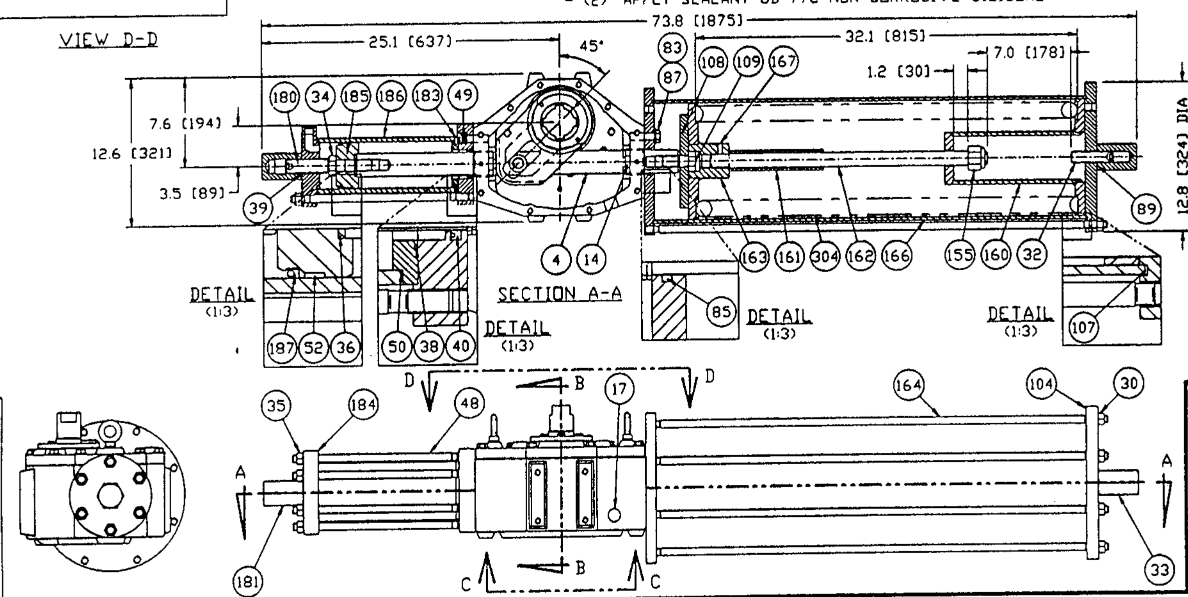
DWG. NO. AB0444-10



ITEM	PART NO.	DESCRIPTION	MATERIAL	QTY	NOTE
155	005-095	LOCKNUT, SPRING	HEXL GR 5 ZN.PL	1	
156	700-030	DECAL	PLASTIC	1	(N)
160	003-160	SPRING BARREL	A36/A106	1	
161	003-161	SPRING STOP	CS P.C	1	
162	003-162	SPRING RETAINING ROD	C1018 PL	1	
163	003-163	SPRING RETAINER	CS P.C	1	
164	003-164	STAY ROD, S	4140 P.C	8	
166		SPRING HOUSING	FWT UNLINED	1	(1)
167	650-390	SETSCREW, SPRING RET.	HXSS SS 304	1	
170	606-723	BREATHER/VENT	NOT BRASS	2	(N)
171	606-212	REDUCER, S	A105	1	(N)
172		REDUCER, P	A105	1	(N)
173	606-501	PORT PLUG, S	HXSP SS 304	1	(N)
174		SEALANT, ADHESIVE	SILICONE, ml	4	(N)
180	003-090	END STOP, H	GR B7 P.C	1	
181	003-091	END STOP COVER, H	C12L15	1	
182		CYLINDER PLATE, H	A516-70 P.C	1	
183		CYLINDER RING, H	C1020 P.C	1	
184		END CAP, H	A516-70 P.C	1	
185		PISTON, H	4140 ANN	1	
186		CYLINDER, H	C1026 MH	1	
187		POLYPAK, PISTON, H	MOLYTHANE/SS 302	1	(Y)
304	003-304	SPRING	ALLOY STEEL	1	

NOTE:
- (N) NOT SHOWN
- (Y) RECOMMENDED SPARE PARTS/REPAIR KIT
- (1) OR DAMAGED AMALGON ALTERNATE
- (2) APPLY SEALANT UB 77C NON-CORROSIVE SILICONE

ITEM	PART NO.	DESCRIPTION	MATERIAL	QTY	NOTE
1	003-001	DRIVE CASE & COVER	AL 432	1	
3	003-003	YOKE	A148-90-60	1	
4	003-004	DRIVE ROD	4140 CH.PL	1	
5	003-005	DRIVE PIN	4140 (Q & T)	1	
6	003-006	DRIVE ROLLER	SS 416 (Q & T)	2	
7	003-007	YOKE COVER	AL 432	1	
8	050-038	POSITION INDICATOR	SAE 1008	1	(N)
9	620-248	O-RING, YOKE	NITRILE	1	(Y)
10	003-010	YOKE BUSHING	DELRIN	2	
12	003-012	YOKE BEARING	HDPE	2	
13	003-013	GASKET, YOKE COVER	HDPE	1	(2)
14	003-014	ROD GUIDE	DELRIN	2	
15	003-015	SNAP RING, DRIVE PIN	SAE 1075	2	
16	630-586	EYEBOLT	A489 PL	2	
17	003-017	BREATHER PLUG	PLASTIC	1	
18	650-584	LOCKWASHER, EYEBOLT	HLCK SS 304	2	
19	630-507	CAPSCREW, DRIVE CASE	HXHC GR 5 ZN.PL	10	
20	650-203	CAPSCREW, YOKE COVER	HXHC SS 304	3	
21	650-103	CAPSCREW, POS. IND.	HXHC SS 304	1	(N)
22	650-585	FLATWASHER, DRIVE CASE	WSHS SS 304	10	
24	700-099	DRIVE SCREW, NAMEPLATE	SS 301/../304	2	(N)
25	650-180	NUT, POS. IND.	HEXN SS 304	1	(N)
26	003-026	PIN, DRIVE CASE	DRILL ROD	2	
30	630-680	NUT, STAY ROD, S	HEXN GR 5 ZN.PL	8	
32	003-032	END STOP, S	GR B7 P.C	1	
33	003-033	END STOP COVER, S	C12L15	1	
34	630-951	CAPSCREW, PISTON	HXHC GR 5 ZN.PL	1	
35	631-325	NUT, STAY ROD, H	HEXN GR 2H	6	
36	620-224	O-RING, PISTON CENTRE	NITRILE	1	(Y)
38	620-149	O-RING, CYLINDER RING	NITRILE	1	(Y)
39	620-126	O-RING, END STOP, H	NITRILE	1	(Y)
40	624-220	POLYPAK, DRIVE ROD	MOLYTHANE	1	(Y)
48	003-048	STAY ROD, H	4140 P.C	6	
49	630-654	CAPSCREW, CYL. PLATE, H	HXSC GR 8 ZN.PL	6	
50	620-155	O-RING, CYLINDER, H	NITRILE	2	(Y)
52	624-540	WEAR RING, PISTON, H	MOLYGARD	1	
64	700-100	NAMEPLATE	SS 304	1	(N)
83	630-608	CAPSCREW, CYL. PLATE	HXHC GR 5 ZN.PL	6	
85	620-329	O-RING, DRIVE ROD	NITRILE	1	(Y)
87	630-685	FLATWASHER, CYL. PLATE	WSHS C1018 ZN.PL	6	
89	620-126	O-RING, END STOP, S	NITRILE	1	(Y)
101	003-101	CYLINDER PLATE, S	C1020 P.C	1	
104	003-104	END CAP, S	C1020 P.C	1	
107	005-068	GASKET, SPRING HOUSING	JM CLIPPER NA-60	2	(Y,2)
108		BACK PLATE, SPRING RET.	AL 6061-T6	1	
109	630-971	CAPSCREW, BACK PLATE	HXHC GR 5 ZN.PL	1	



UNLESS SPECIFIED OTHERWISE
ALL DIMENSIONS INCHES (mm)

REV BY-DATE-REF

TOLERANCES
XXX ±0.5 (±10)
XX ±0.2 (±5)
X ±0.1 (±2)

BETTIS Actuators & Controls BETTIS CANADA LTD.

SERIES 3 SPRING RETURN HYDRAULIC ACTUATOR
TYPICAL ASSEMBLY AND PART LIST
MODEL 1030-SRHX100, S/N PREFIX "25"

A-0520--.DWG
JUN-13-97

500 LB

SCALE 1:10 | BY DY | CHK'D | DATE MAR-17-97

V.O. 10573-1-R | DWG. NO. AB0520 | REV --

IV SELF CONTAINED HYDRAULIC MODULE NOTES